REMARKS

I. Introduction

In response to the pending rejection, Applicants respectfully request reconsideration of the pending claims in view of the following remarks.

II. The Rejection Of Claims 1-4, 8-11 And 15-18 Under 35 U.S.C. § 102

Claims 1-4, 8-11 and 15-18 were rejected under 35 U.S.C. § 102(e) as being anticipated by USP No. 6,777,142 to Pierrat. Applicants respectfully request reconsideration of the pending rejection for the following reasons.

The present invention relates to a novel method for placing optical proximity correction (OPC) features within a mask design that allows for deep sub-wavelength mask patterns to be imaged using substantially any illumination condition through pitch. Moreover, the method eliminates the need for a highly skilled mask designer to determine placement of the OPC features in order to achieve optimal imaging performance.

As recited by each of the pending independent claims, the method of the present invention entails determining an "interference map" based on the target pattern which defines areas of constructive interference and destructive interference between the features to be imaged and the field areas surrounding and adjacent to the features to be imaged. Once the areas of constructive and destructive interference are identified, assist features are placed in the target pattern based on the locations of the areas of constructive and destructive interference. Referring to Applicants' specification, the interference map illustrates whether each point in the field surrounding the desired target point interacts constructively (i.e., making the intensity of the transmitted light on the target pattern greater), destructively (i.e., making the intensity of the

transmitted light on the target pattern lower) or is neutral (i.e., not altering the intensity of the light on the target pattern). As noted, the interference map can be generated using known simulation tools.

Once the interference map is generated, assist features are placed in the mask design based on the locations of the areas of constructive interference and destructive interference. For example, phase-shifted assist features may be placed in areas of constructive interference, and non-phased-shifted assist features may be placed in areas of destructive interference. In this example, the phase-shift assist features function to further enhance the intensity of the light when placed in constructive areas, and the non-phase-shifted assist features function to negate the destructive interference in the destructive interference areas.

Turning to Pierrat, this reference is directed to a method for resolving phase conflicts which occur when utilizing phase-shifting feature to implement target features to be imaged on the wafer. As explained for example in col. 3, lines 4-22, the method of Pierrat includes adjusting for phase conflicts in a first mask, which can be caused by the end portions of the features formed utilizing phase-shifting areas, by dividing the phase-shift area into two areas having a first and second phase-shift and disposing an opaque feature between the two phase-shift areas. The process further includes the generation of a complementary mask which has an opaque portion for preventing exposure of the features to be printed by the first and second phase shift areas of the first mask, and a cut-out area over the opaque feature separating the first and second phase shift regions so as to expose any feature resulting from the phase difference between the first and second phase regions.

Importantly, however, Pierrat does not disclose generating an interference map as recited by the claimed invention. First, as noted above, the interference map of the present invention

illustrates whether each point in the field surrounding the desired target point interacts constructively, destructively or is neutral relative to the feature to be imaged. Pierrat does not disclose or suggest the generation of such a map. Pierrat simply identifies locations where possible phase-conflicts exist by identifying the portions of the phase-shift mask where phase-changes occur. However, there is no information generated in the process of Pierrat indicating whether a given point interferes constructively, destructively or is neutral relative to the imaging of the feature. Indeed, it does not appear that Pierrat confirms whether or not such phase-conflicts degrade the imaging performance, it is just assumed that they do, which is an incorrect assumption. As such, Pierrat does not disclose generating information concerning whether the points around a given feature interfere constructively, destructively or are neutral with respect to the imaging of the feature. Thus, Pierrat does not disclose the interference map recited by the pending claims. Even assuming *arguendo* that the identification of the phase-conflict areas could be consider an interference map, such a map still fails to disclose areas of constructive interference as recited by the pending claims, and therefore does not read on the interference map of the present invention.

Furthermore, as it is clear that, at a minimum, Pierrat does not disclose generation of information concerning the areas of constructive interference, Pierrat also fails to disclose placing assist features based on the locations of areas of constructive interference as defined by the interference map as recited by each of the independent claims.

Thus, as anticipation under 35 U.S.C. § 102 requires that each element of the claim in issue be found, either expressly described or under principles of inherency, in a single prior art reference, ***Kalman v. Kimberly-Clark Corp.***, 713 F.2d 760, 218 USPQ 781 (Fed. Cir. 1983), and

at a minimum, Pierrat does not disclose the claim elements noted above, it is clear that Pierrat does not anticipate claim 1, 8 or 15, or any claim dependent thereon.

It is also noted that Pierrat clearly fails to disclose the subject matter recited in the rejected dependent claims. For example, claim 2 recites a specific process for generating the interference map, which entails reducing the size of the features in the target pattern such that they are less than the resolution capabilities of the given system and performing the simulation process on the reduced size pattern. This allows the simulation process to focus on the center of the feature when generating the interference map. Nowhere does Pierrat disclose or suggest such a process. Claim 7 recites that the interference map exhibits a non-zero DC level, which allows the interference map to indicate both positive and negative intensity levels. Once again, Pierrat is silent regarding any such process. As such, it is also respectfully submitted that the rejected dependent claims are patentable over Pierrat for reasons additional to those discussed above in conjunction with the independent claims.

For all of the foregoing reasons, it is respectfully submitted that the pending claims are patentable over Pierrat.

III. All Dependent Claims Are Allowable Because The Independent Claim From Which They Depend Is Allowable

Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, ***Hartness International Inc. v. Simplimatic Engineering Co.***, 819 F.2d at 1100, 1108 (Fed. Cir. 1987). Accordingly, as claims 1, 8 and 15 are patentable for the reasons set forth above, it is respectfully submitted that all pending dependent claims are also in condition for allowance.

IV. Request For Notice Of Allowance

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication for which is respectfully solicited.

If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account and please credit any excess fees to such deposit account.

Respectfully submitted,

McDERMOTT WILL & EMERY LLP

Michael E. Fogarty
Registration No. 36,139

Please recognize our Customer No. 20277 as our correspondence address.

600 13th Street, N.W.
Washington, DC 20005-3096
Phone: 202.756.8000 MEF:men
Facsimile: 202.756.8087
Date: August 11, 2005

WDC99 1116256-1.055071.0329